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SOME RECORDS OF PARASITIC ANEURYSM IN CLINICALLY AFFECTED HORSES

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In the course of dissection at the Royal Veterinary College ponies are, as a routine measure, subjected to examination for any material that may prove of interest to other departments of the College. Parasites and the effects of parasitic invasion form by far the greatest percentage of such findings, and we have already an extensive list of these, including the percentage of simple aneurysms found about the course of the anterior mesenteric artery. This percentage is in agreement with those recorded by many authors.

It is not our intention to give here a full record of these findings (this we hope to do later when we have examined more material) as the majority of them appeared to have little or no clinical significance. The routine examination of one pony (No. 2 in the tables), however, in which a rather heavier infestation than usual seemed to coincide with a very poor condition, made us resolve to intensify our efforts, to make more detailed examinations, and, if possible, to try and correlate the degree of infestation with the effect on the animal. Later, we were fortunate in obtaining a series of ponies which exhibited somewhat similar clinical symptoms (Nos. 7, 8, 9 and 10 in the tables). They were all from the same farm and kept under similar conditions.

The fact that, in the course of dissection, the ponies were literally " taken to pieces," enabled us to examine every tissue of the body for the possible presence of adult or larval parasites, or the effects of both. In 1939 we had the pleasure of listening to Dr. E. L. Taylor giving a paper to this Society entitled " The Role of Pastures in the Development of the Strongyloid Diseases of Grazing Animals " ; he referred to many interesting points in that paper, but the point that stuck in our minds more than any other was that he said the degree of infestation in what might be considered healthy animals on normal pastures was amazing. We have always borne that point in mind and have accepted many of our findings on that score as being nothing extraordinary, but we think you will agree that the cases we are about to relate do not exactly fall under the category of normal.

The histories have been condensed and we intend to introduce these records with the help of tables and photographs.

*Paper (illustrated by lantern slides) presented to the meeting of the Central Division, N.V.M.A., held at Reading, February 6th, 1941.

Amplification of the Tables

Bodily Condition.—As applied to ponies 7, 8, 9 and 10, the term " emaciated " is really a mild one ; when clipped out they were literally very little more than skin and bones, a point which any of the students who saw them will verify. No. 2 was described by the owner as not a " good doer."

Rectal Examination.—In each case an aneurysm of the anterior mesenteric artery was palpated. In Nos. 7 and 8 no attempt was made to palpate many structures, but in the others a more extensive examination was made in order to identify a few " landmarks." Even then it was impossible always to form an accurate opinion as to all the structures involved, but experience, coupled with *post-mortem* examination, should make this more practicable. Results this year have been more successful.

Faecal Examination.—We decided, as a result of the extensive parasitic infestations found in Nos. 7 and 8, to carry out examinations of the faeces of subsequent ponies before they were destroyed. Thus, No. 9 was the first animal from which a faecal sample was taken, and it can be seen in Table I that a very large number of strongyle eggs was found. If such counts had been made in the previous cases it is probable that high counts, similar to those that have since been recorded, would have been noted. Although the sites of parasitic infestation were similar to those described in the preceding cases, No. 9 was, up to the present, by far the most heavily infected.

It would have been more satisfactory to have made faecal examinations of all the animals in this series and, in the present investigations on a further group, both faecal examinations and blood films are made at the time of destruction. A correlation of results of faecal examinations with a count of the total number of parasites found would have been useful, but there were no facilities for carrying out the latter procedure, because the viscera are primarily intended for the use of anatomy students.

Blood Examination.—After the animals had been anaesthetised, the carotid artery cannulated, and the ponies were being bled out, it was quite obvious that the blood was not normal. We record the findings in Table I. We must apologise for the rather unphysiological terms but we hope you will understand what is meant. More important would appear to be the microscopical examination of blood which, however, was not made on the ponies included in this paper but is now a routine procedure.

Table I

Index No.	2	7	8	9	10
Description of animal	Cross bred Shire yearling colt	8½ month chestnut New Forest mare	9 month brown New Forest colt	9½ month light bay New Forest mare	10½ month dark bay cross New Forest colt
Bodily condition	Very poor	Coat "starey" and poor, extremely emaciated, unable to stand without assistance	Emaciated and weak, some evidence of paralysis in hind quarters	Extremely emaciated, complete absence of fat deposits. Visible m/ms white	Emaciated, but better than 7 or 8
Rectal examination. (Structures palpated)	Origin of iliac arts. normal, large aneurysm immediately anterior to them	Aneurysm root of a.m. art., other structures not examined	Aneurysm root of a.m. art., other structures not examined	Aneurysm to the right and at root of a.m. art., hilus of both kidneys, post. edge of spleen	Aneurysm root of a.m. art. between the two kidneys
Faecal examination	Not made	Not made	Not made	12,000 strongyle, 900 ascaris eggs per gramme faeces	8,400 strongyle, 200 ascaris eggs per gramme faeces
Blood examination (macroscopic)	Not observed	Thin, watery, light pink	Thin, watery, slow to clot. Large amount of serum	Slightly watery, pink	Slightly watery, quick to clot

Table II

Index No.	2	7	8	9	10
Dissection Findings (*a*) Alimentary	Parasites found :— *Strongylus edentatus* *Strongylus vulgaris* *Trichonema* *Triodontophorus* *Ascaris equorum* *Anoplocephala perfoliata* *Gastrophilus intestinalis* larvae	Parasites found :— *Strongylus edentatus* *Strongylus vulgaris* *Trichonema* *Triodontophorus* *Ascaris equorum* *Anoplocephala perfoliata* *Gastrophilus intestinalis* larvae	Parasites found :— *Strongylus edentatus* *Strongylus vulgaris* *Trichonema* *Triodontophorus* *Oxyuris equi* larvae *Gastrophilus intestinalis* larvae Circular plaques on serous surface of small intestine	Parasites found :— *Strongylus edentatus* *Strongylus vulgaris* *Trichonema* *Triodontophorus* *Ascaris equorum* *Gastrophilus intestinalis* larvae Circular plaques on serous surface of small intestine	Parasites found :— *Strongylus edentatus* *Strongylus vulgaris* *Trichonema* *Triodontophorus* *Ascaris equorum* *Gastrophilus intestinalis* larvae
(*b*) Peritoneal	No evidence of extra - peritoneal cysts or larvae	(1) Nodules on small intestine between peritoneal layers (2) Subperitoneal cysts on small intestine (3) Cysts in subperitoneal c/t. overlying transversalis m.	Cysts in subperitoneal c/t. overlying transversalis m.; part very necrotic	Three nodules adjacent to mesenteric attachment of small intestine. Many cysts in subperitoneal c/t.	Cysts in subperitoneal c/t. overlying transversalis m.
(*c*) Arterial (aneurysms)	Root of a.m., coeliac axis and renal arts.	Root of a.m. and branches (direct colic), coeliac axis and renals; walls thickened but lumen not affected. Aorta dilated	Root of a.m. and branches; wall thickened. Aorta dilated from root of coeliac to posterior mesenteric, with evidence of aneurysm	Root of every artery from coeliac to ovarian. Large fibrous deposits on arterial wall. Aorta dilated with evidence of aneurysm	Root of every artery from coeliac to ovarian. Coeliac + +, retrograde and direct colic. Aorta dilated with evidence of aneurysm

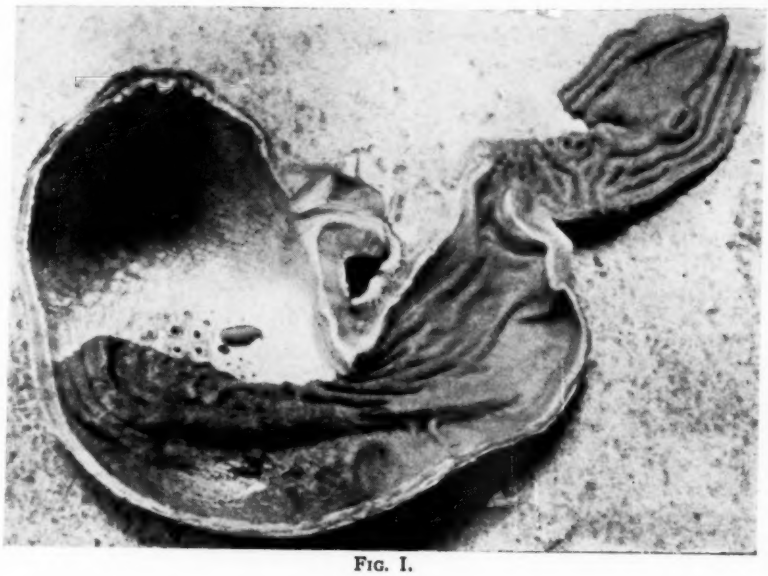

FIG. I.

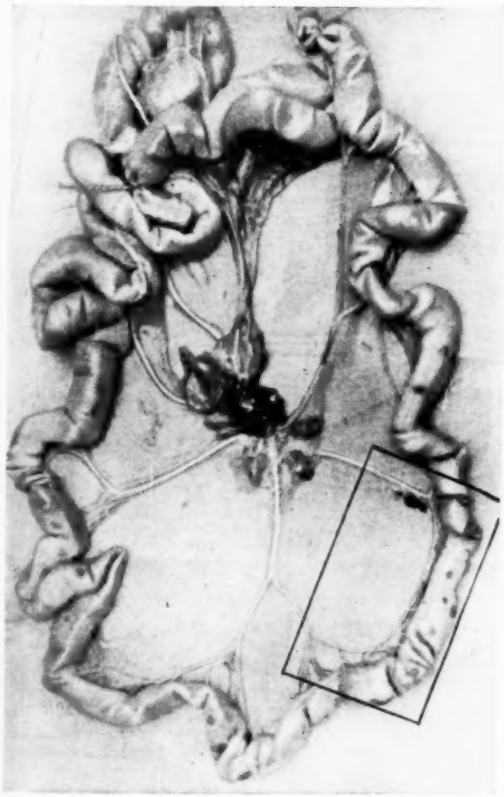

FIG. II.

FIG. III.

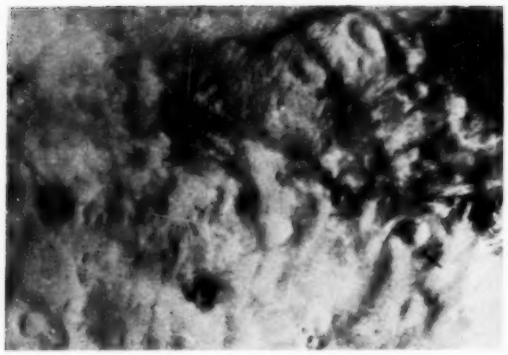

FIG. IV.

FIG. V.

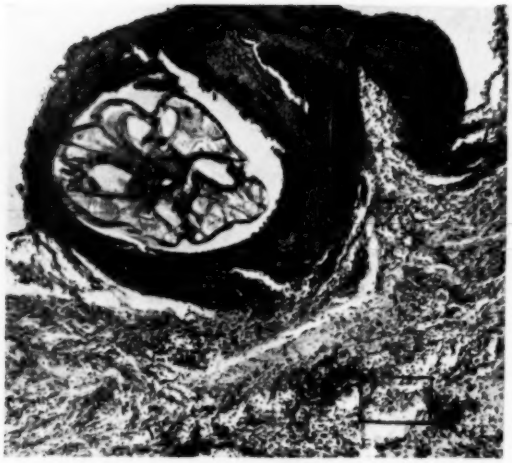

FIG VI.

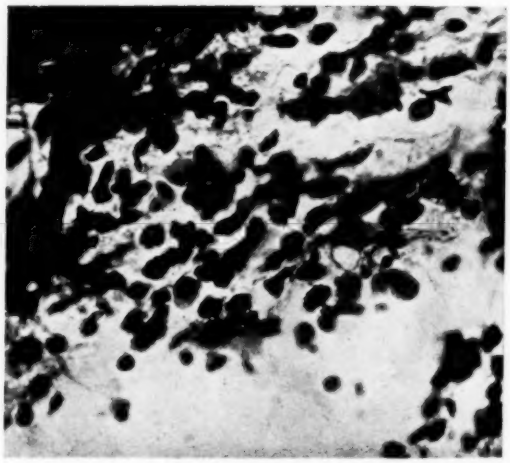

FIG. VII.

KEY TO FIGURES

FIGURE I.—Inner aspect of the stomach of a horse showing results of infestation with *Gastrophilus intestinalis* larvae.

FIGURE II.—Coil of ileum showing enlarged lymph nodes, haemorrhage in the mesentery and " plaques " on intestinal wall. (Pony No. 9).

FIGURE III.—Magnification of area marked in Figure II.

FIGURE IV.—A portion of the transversalis muscle with the peritoneum attached showing *S. edentatus* larvae, one of which is marked with an arrow, and areas of haemorrhage. (Pony No. 9).

FIGURE V.—Cross section of a branch of the anterior mesenteric artery showing *S. vulgaris* larva in lumen. (Pony No. 8). × 60.

FIGURE VI.—Cross section of a vaso vasorum of the anterior mesenteric artery showing *S. vulgaris* larva. (Pony No. 8). × 60.

FIGURE VII.—Magnification of area marked in Figure VI, showing eosinophils in the surrounding inflammatory tissue. (Pony No. 8). × 500.

Dissection Findings

(*a*) *Alimentary.*—We realise that these cannot be stressed because, firstly, as Dr. Taylor has pointed out, the degree of infestation of both pastures and animals is amazing and, secondly, total counts of the parasites present were not made. We feel safe, however, in saying that the numbers were well above normal. Although it is interesting to note that *Gastrophilus intestinalis* larvae are nearly always situated in the oesophageal area of the stomach, where they become deeply embedded and may leave an " ulcer " in the mucosa, and that they seldom attach themselves to the mucosa of the acid digestive areas of the fundus and pylorus, it was observed that one or two had become attached to the mucosa of the alkaline duodenum (Fig. 1). In No. 10 the greatest distance between any two " bot marks " in the oesophageal area was 2 cm. In No. 2 a noticeable portion of the small intestine was tightly packed with *Ascaris equorum* adults, and the stomach was heavily infested with " Bots " (*Gastrophilus* species).

(*b*) *Peritoneal.*—The degree of infestation of the extra-peritoneal areas of the abdomen was amazing; apart from the facts as seen in Table II, a study of the figures will give some idea of the widespread nature of the invasion. Fig. II, which is a typical coil of the ileum from pony No. 9, shows the enlarged lymph glands at the root of the mesentery which were of a soft and spongy texture. These were adjacent to the aneurysm. Following down the mesentery there was a distinct area of haemorrhage between the layers of the mesentery, and there were also pin-point haemorrhages along the course of the blood vessels; finally, peculiar elevated " plaques " were situated on the intestinal wall between the peritoneum and the wall itself, *i.e.*, still extra-peritoneal. These " plaques " resembled small raised button areas about 1 cm. in diameter. They contained neither fluid nor larvae. There were also smaller haemorrhagic streaks and circular areas on the surface; whilst, on the mucous surface, roughened areas could be seen corresponding to the position of the external " plaques," which are well shown in Fig. III. Histologically, they were found to consist mainly of fibroblasts, with a few small vessels. There was no definite epithelium covering the free surface. The " plaques " were separated from the underlying muscular layer by a narrow zone of connective tissue, from which they were clearly demarcated. There were many eosinophils scattered around Peyer's patches as well as in the serosa.

Fig. IV shows a typical portion of the abdominal surface of the transversalis muscle with the peritoneum still attached, and is from pony No. 9. The darker parts are haemorrhagic areas and a careful scrutiny will reveal numerous *Strongylus edentatus* larvae coiled up beneath the peritoneum. One larva had burrowed through the muscular wall and was found encysted on the cutaneous surface of the oblique muscle.

In No. 8 a large part of the abdominal wall showed a heavy infection with *S. edentatus* larvae. One portion was very necrotic and contained many pockets of pus, in which some of the larvae were situated.

In No. 7 also, the subperitoneal tissue of the abdominal wall was heavily infested with *S. edentatus* larvae, many of which were lying freely in the connective tissue, whilst others were coiled up in small cysts. When the pony was first opened many larvae were found lying freely in the peritoneal cavity, on the omentum, on the serous coat of parts of the intestine in contact with the abdominal wall, and on the visceral peritoneum.

In No. 10, the cysts caused by *S. edentatus* larvae in the subperitoneal connective tissue were numerous but not so easily visible from the peritoneal surface as those in No. 9. Neither was there any comparable haemorrhage of the tissues.

Also in this pony there were small pin-point haemorrhages in the mesentery along the course of the blood vessels and, in addition, a haemorrhagic area lying in the mesentery against the intestinal wall. This area contained blood clot only and no parasites were present at the time of examination. The lymph glands along the course of the direct and retrograde colic arteries were enlarged but were of normal consistency.

In No. 7, two nodules found in the mesentery near the small intestine closely resembled lymphatic glands to the naked eye, but their atypical position suggested that a further investigation of their structure might be helpful. From each of these nodules one *S. vulgaris* larva was recovered. A sub-peritoneal cyst on the small intestine also contained a single larval *S. vulgaris* embedded in the characteristic creamy white inspissated material. Of the three nodules in the mesentery in No. 9, two were about 1 cm. in diameter and consisted of cavities filled with a creamy coloured pus-like material, and from which a larval *S. vulgaris* was recovered.

(*c*) *Arterial.*—The nature of the aneurysm at the root of the anterior mesenteric artery varied; its general shape was circular but its excursions into the initial portions of the branches gave it the appearance of a root. Its dimensions varied from 2 to 4 inches across and 3 to 5 inches long. In other arteries it was restricted to about the first inch or two of their course and was bulbous in nature. In No. 10 it affected the whole of the hepatic branch of the coeliac axis. The effect on the aorta, in Nos. 7 and 8 particularly, was one of extreme dilatation and only when dissected out could its full extent be seen. Although the arterial walls were thickened in every case, the actual lumen of the arteries did not seem unduly affected.

Macroscopical Changes.—These give another idea of the extent of the infestation. Some can be seen in Figs. II, III and IV. The most interesting points were the adhesions between tissues, the pressure on surrounding viscera and the number of small pits resulting from the presence of encysted *S. edentatus* larvae. Apart from the points noted in the table, the tissues to which some of the aneurysms were adherent and upon which pressure was exerted were the termination of the oesophagus, pancreas, duodenum, adrenals, kidneys and the vago-sympathetic trunk and ganglia situated on the ventral aspect of the aorta. The muscles, although pitted, did not appear weakened by the presence of the cysts.

Situation and Diagnosis of Parasites.—Apart from their extra-peritoneal position as seen in Figs. II, III and IV, strongyle larvae were also noticed to have migrated into the fascia of the abdominal muscles and even subcutaneously. Nests were found in the following muscles and their tendons; obliquus abdominis externus and internus, rectus abdominis,

Table III

Index No.	2	7	8	9	10
Macroscopic Changes	A.m. root distorted 4 × 2·5 in. Tissue adhesion between surrounding viscera, including vago-symp. ganglia. ? cause of paralysis	A.m. root distorted 4·5 × 2·5 in.; marked pressure on surrounding viscera. Abdominal lymph nodes enlarged	Initial portion right branch a.m. enlarged 3·5 × 2 in. No excessive pressure on viscera. Abdominal lymph nodes enlarged. Lumen of artery narrowed, 5/16 in.	Whole aortic trunk enlarged. Root of a.m. enlarged and adherent to caecum; marked pressure on surrounding viscera. Diffuse haemorrhagic areas in subperitoneal c/t. Many lymph nodes enlarged all over body, pinkish. Mesentery thickened. Splenic art. 4 × 2·25 in.	Pancreas, kidneys, adrenals, vago-symp. ganglia and trunk adherent to enlargements of practically the whole aortic trunk. Extravasated areas on wall of colon and over abdominal wall. Lymph nodes enlarged all over body. Dilated aorta approximately 8 × 2·25 in.
Situation and Diagnosis of Parasites	Larvae (partially gelatinised — undiagnosed) in cyst in popliteal m. of near hind leg	*Strongylus edentatus* larvae. (*a*) subperitoneal cysts on and in transversalis m. (*b*) Lying freely in peritoneal cavity, on serous surface of parts of intestine lying adjacent to flank, and lying on visceral peritoneum	*Strongylus edentatus* larvae. (*a*) subperitoneal cysts on transversalis m.	*Strongylus edentatus* larvae. (*a*) subperitoneal cysts on and in transversalis m. (*b*) Lying on organised haematoma on right kidney	*Strongylus edentatus* larvae. (*a*) subperitoneal cysts on transversalis m.
	Strongylus vulgaris larvae (*a*) aneurysm of a.m. root (*b*) aneurysm of aorta (*c*) aneurysm of renal art.	*Strongylus vulgaris* larvae (*a*) aneurysm of right branch a.m. (*b*) aneurysm of direct colic (*c*) aneurysm of aorta, coeliac axis and root a.m. (*d*) subperitoneal cysts on small intestine (*e*) nodules on small intestine between peritoneal layers (*f*) subcapsular renal haematoma	*Strongylus vulgaris* larvae (*a*) aneurysm of a.m. (*b*) aneurysm of aorta	*Strongylus vulgaris* larvae (*a*) aneurysm of a.m. (*b*) aneurysm of direct colic (*c*) aneurysm of coeliac axis (*d*) in nodules in mesentery *Triodontophorus tenuicollis* Aneurysm of intestinal portion of root of a.m.	*Strongylus vulgaris* larvae (*a*) aneurysm of a.m. (*b*) aneurysm of direct colic (*c*) aneurysm of aorta and coeliac axis

transversalis abdominis, psoas major, quadratus lumborum, iliacus and the muscle of the diaphragm. Although in pony No. 2 larvae were found in a cyst in the popliteal region they were, unfortunately, destroyed before they could be identified. Reports from students of "very tough muscle" and an excessive amount of "fibrous tissue" suggest that larvae may have been present in other areas as well.

Multiple aneurysms of the aorta, extending from the coeliac axis to the iliac arteries, were present in pony No. 2. The iliac arteries, however, were not affected. The aneurysm involving the root of the anterior mesenteric artery consisted of three saccular dilatations and was 4 × 2·5 inches in size. There were also two smaller fusiform aneurysms involving the root of the coeliac axis and the origin of the renal arteries. From the aorta and the above-named branches a total of 106 *S. vulgaris* larvae were recovered.

In pony No. 7 the direct colic artery was surrounded by a fusiform mass of dense fibrous tissue, 4 × 1·5 inches, in which were situated numerous spherical cavities, about 1 cm. in diameter; each contained a brownish white material resembling inspissated pus, in some of which were embedded larval *S. vulgaris*. Although the lesion appeared to be a fusiform aneurysm, it was found, upon dissection, that the lumen of the artery was not affected except for a slight narrowing as a result of pressure. The aneurysm on the course of the right branch of the anterior mesenteric artery was small and fusiform (1·5 × 1 inch); it was situated about 0·5 inch from the larger aneurysm (4·5 × 2·5 inches), which involved the root of the anterior mesenteric artery. From these two aneurysms 218 larvae of *S. vulgaris* were recovered. The aorta was dilated from the origin of the coeliac axis to the root of the anterior

mesenteric artery, but the walls showed no change other than a slight roughening near the commencement of the coeliac axis. Seventy-five *S. vulgaris* larvae were, however, found in the aorta.

In pony No. 8 the aneurysm of the anterior mesenteric artery was one of the few showing a lumen of diminished calibre, being only $\frac{1}{8}$ inch in diameter, although the outer dimensions were $3{\cdot}5 \times 2$ inches. The aneurysm was of the tough, fibrous, unyielding-on-pressure type and from it 59 *S. vulgaris* larvae were recovered. Fig. V shows a larva inside the lumen of the artery. It illustrates very well the enormous infiltration of inflammatory cells, which are lying on the muscular layer of the artery, into the wall. Fig. VI shows a larva within an aneurysm of a *vaso vasorum* of the anterior mesenteric artery. Again, surrounding it is an extensive mass of inflammatory tissue. The very dark ring encircling the parasite comprises very closely packed cells which rest on a connective tissue layer, beneath which is the tunica media. In Fig. VII some of these cells can be seen more clearly. In this small area a number of eosinophils are evident, and hundreds more were found scattered in the cellular layer. Some of the other cells are histiocytes, fibroblasts, monocytes and a few lymphocytes.

From the aorta, origin of the coeliac axis and root of the anterior mesenteric artery in pony No. 9, 39 *S. vulgaris* larvae were recovered and 16 were present in the intestinal portion of the root of the anterior mesenteric artery, whilst 10 larvae were found in the aneurysm of the direct colic artery.

From the aneurysms of the aorta and the coeliac axis in pony No. 10, 30 *S. vulgaris* larvae were recovered and 83 were found in the direct colic artery. Sections of this artery revealed the typical picture of enormous numbers of eosinophils in the muscular coat as well as in the hypertrophied outer coat.

Notes on Other Ponies Seen During 1940, but Not Recorded in the Tables

Pony No. 1 was the only animal encountered last year which was not affected with aneurysm. Nos. 3, 4, 5 and 6 were comparatively normal ponies and showed no obvious clinical manifestation of parasitic invasion. Nevertheless, in each case there was a distinct aneurysm at the root of the anterior mesenteric artery of a size varying from 3×2 inches in No. 3 to 4×3 inches in No. 4. Pressure on the surrounding viscera was not observed, neither was there an excessive number of parasites in the alimentary canal, nor evidence of invasion in other parts of the body. These ponies, therefore, were in the same category as the majority of ponies encountered in the dissection room at the Royal Veterinary College at Camden Town, of which we have records, and very similar to the ones we have examined in the latter part of 1940.

It is rather remarkable, and is a point that has often amazed us, that ponies of this nature show little or no clinical symptoms of parasitism when the aneurysms, although not so large or ramifying as in the cases on record in this paper, must have had some effect by pressure on such structures as the adrenals, kidneys and the vago-sympathetic nerve trunks, and by growth on the amount of blood passing to a large portion of the alimentary tract.

Another point worthy of note was that, in at least two of these cases (Nos. 4 and 6), the aneurysm was not noticed until detailed dissection of the sub-lumbar region was undertaken and would not have been noticed at an ordinary *post-mortem* examination. This fact, we feel, should be borne in mind when considering statistics of the percentage of aneurysms present in horses as noticed at *post-mortem* examinations.

DISCUSSION

Bodily Condition.—Taking into account all the lesions found, and which have been described above, the extreme emaciation observed in the ponies could definitely be attributed to parasitism only. These animals constituted marked clinical cases and, as previously mentioned, it is noteworthy that other ponies, not dealt with in the tables, were not clinical cases. In the severe cases treatment was obviously of no avail, but it should be possible to diagnose early and treat with success.

Rectal Examination.—Palpation of the root of the anterior mesenteric artery is, in our minds, of first-class importance. From our records, and those of many others, this region is affected early, quite possibly before the advent of any other symptoms. Although the aneurysm itself may not be of great consequence it is an indication of parasitic invasion. Thus, rectal, coupled with other examinations, may prove of value in arriving at an early diagnosis and the introduction of preventive and medicinal measures.

This region is comparatively easy to palpate, but we found it advisable to identify other structures in the neighbourhood. The kidneys were found to be the best as the artery lies between them. In one case —No. 9—the edge of the spleen was felt without much difficulty. No evidence of aneurysm or thrombus formation was detected at the origin of the iliac arteries, and this was confirmed later at *post-mortem* examination; in fact, the steady pulsation of the aorta at this point was one of the most noticeable features.

The routine method of examination is first to locate the origin of the iliac arteries, then to proceed along the ventral aspect of the aorta, slightly to the left of the mid-line, until the posterior pole of the left kidney is reached. The root of the anterior mesenteric artery is immediately to the right of, and slightly anterior to, this kidney. An aneurysm appears as a large pulsating structure a little below, and of approximately the same size as, the pole of the left kidney already located.

Faecal Examination.—The method adopted for the estimation of the number of eggs per gramme of faeces was a modification of the Stoll technique.

According to Taylor (1939b) 10,000, and above, e.p.g. of faeces represents a severe infection. The estimate of 12,000 e.p.g. in pony No. 9 was thus indicative of a heavy infestation, and was supported by subsequent *post-mortem* findings. However, it is well recognised that there are many drawbacks to this method. Taylor (1938) states that the results are influenced by "the very wide variation in the concentration of eggs as a result of variation in the consistency of the faeces, in the composition of the food, the state of maturity of the worms and the state of immunity of the host animal (which influences the rate of reproduction of the worms). There is also a special difficulty in the horse where a large number of different species of worms are associated with redworm disease. These worms are of different sizes

and doubtless of very different pathogenicity yet they all lay eggs of the same shape and size, so that an ordinary egg count does not reveal the nature of the infestation which in one instance may be dangerous and in another of little consequence in spite of similarity in the egg count."

From these remarks it is evident that, whilst an egg count may be a very valuable aid to diagnosis in conjunction with an examination of the physical condition, it may sometimes be very misleading. It will be interesting to compare the results of the faecal examinations with the dissection findings in future cases.

Blood Examination.—The finding of large numbers of eosinophils in sections of some of these aneurysms led us to hope that the demonstration of an eosinophilia by the simple method of making a differential leucocyte count might prove to be an aid to the diagnosis of verminous aneurysm. This was attempted by Moore, Haring and Cady in 1904, who were able to establish a correlation between the presence of verminous aneurysm and the differential leucocyte count. Later, Dowgiallo (1934), working on similar lines, stated that although an eosinophilia was an important auxiliary step in diagnosis, it was not definitely characteristic of worm infestation. Britton (1937) found that a wide range of eosinophilia might occur in a single horse. Although he never found a case of eosinophilia unaccompanied by verminous aneurysm he concluded that eosinophilia, when present, seemed to indicate the presence of parasitic aneurysm of the anterior mesenteric artery rather than adult infestation in the colon.

In our present investigations on a further series of horses, differential white cell counts are made as a routine measure to ascertain whether such a procedure, made over a period of several days and in conjunction with a faecal and rectal examination, would aid the clinical diagnosis of verminous aneurysm. It is fully realised that much further work on equine haematology is necessary before a blood examination alone can be taken as an accurate aid to diagnosis. Stewart and Holman (1940) found that the normal range was very wide and variable, from 1 to 28 per cent., although the latter seems to be exceptional, since the range in the other cases did not exceed 14 per cent. Most authors state that eosinophils are said to represent 2 to 4 per cent. of the total number of white cells. Although the 36 horses examined by Stewart and Holman were apparently normal, they may possibly have been affected with verminous aneurysm in view of the high incidence of the disease.

Despite the difficulties associated with a true interpretation of the presence of eosinophilia we consider that, in view of the enormous numbers of eosinophils which are consistently found in histological sections of these aneurysms, further work on these lines will furnish evidence that useful information may be obtained from the demonstration of eosinophilia in blood films.

Dissection Findings

Peritoneal.—In ponies Nos. 7 to 10, and especially in Nos. 8 and 9, there was extensive tissue injury as a result of *S. edentatus* larvae migrating under the peritoneum lining the abdominal cavity. Many theories have been advanced concerning the toxicity of parasites, but in some cases there has been little actual evidence of toxin production. In these cases in which each encysted *S. edentatus* larva was bathed in pus, it seems reasonable to assume that some toxin absorption did occur, which may have, in part, elicited the clinical symptoms.

Arterial.—The most remarkable feature of the arterial changes was the extent to which the whole abdominal portion of the aortic trunk was involved. Aneurysm of the anterior mesenteric root we expected —indeed so common is it that it might even be considered the normal state of that artery—but the findings in the branches of the anterior mesenteric, at the root of the coeliac axis and the initial portion of its branches, *i.e.*, gastric, hepatic and splenic, and in the renal arteries are, we believe, greater than have been recorded before. The aortic trunk itself, particularly in Nos. 7 and 8, was grossly affected. Two points arise out of these changes. Firstly, that there was not even a greater upset of life than merely extreme emaciation; and secondly, that in no case were the iliac arteries affected by aneurysm or thrombus formation. It has been suggested by some authors that thrombosis of the iliac arteries is due to the presence of strongyle larvae. This definitely has not been our experience as, although we have never found iliac thrombosis, we have found plenty of strongyle larvae.

Macroscopical Changes.—The extent of these changes has already been referred to. Paralysis of the hindquarters, which we have noticed in three cases (Nos. 2, 7 and 8), is the obvious sequel to pressure on the nerves in this region and has been noted by some authors. It was surprising that this symptom was not noticed in other cases. Might it not be that, in some cases of iliac thrombosis, paralysis is due to this pressure? According to Olt (1932) it is pressure on the autonomic ganglia more than obstruction of the lumen of arteries that gives rise to verminous colic in horses.

Situation and Diagnosis of Parasites.—The effects of adult strongyles on the host vary according to the species; whilst *S. vulgaris* is thought to be the most serious and, as Foster (1937) points out, there is apparently no age resistance to this species, little seems to be known of the pathogenic effects of the larvae, and the presence of aneurysm of the anterior mesenteric artery is practically ignored in view of its prevalence.

Of 36 horses examined by Britton (1937), four revealed an egg count of over 1,000, two of which also showed an eosinophilia; both had aneurysms, however, in which more than five *S. vulgaris* larvae were present. The average egg count of horses under eight years was found to be almost twice that of animals over eight years of age. The question of age resistance is of interest since, of the horses examined by us, Nos. 7, 8, 9 and 10 were 8½ to 10½ months old. Although no comparative figures of an age factor were obtainable in these cases it is significant that all four were of approximately the same age, had been kept under the same conditions, and were infested to a very similar degree. As a complete count of the total worm burden carried by each animal could not be made, the actual degree of infestation was not estimated. However, the size and extent of the lesions caused by migrating larvae point to a very early infection. We have since found verminous aneurysm in a 4½ months old foal amongst a fresh group of animals.

Foster and Clark (1937) encountered verminous aneurysm in two out of five foals under one month old, which suggests intra-uterine infection. Foster (1937) concludes from a study of 86 equines in Panama that, since animals from 9 to 15 years of age were infested with approximately twice as many strongyles as those over 15 years, a very definite age resistance existed. There were no records for animals under nine years old, by which time there is already some degree of age resistance. Since probably every equine becomes infected at an early age and, moreover, is constantly being reinfected, an immunity develops slowly with increasing age.

No age resistance to *S. vulgaris* was apparent, since older animals were infected in a similar degree to younger ones. In view of the pathogenicity of *S. vulgaris*, both in the larval and adult stages, it is interesting that all of the 86 animals examined harboured this species. In a further study on 202 equines, Foster and Clark (1937) found aneurysms in 80 per cent. of animals. They described these as active cases, but they did not indicate the extent of the functional damage. The disease was encountered in animals of all ages and, as previously stated, in two of five foals under one month old. They found that after one to two months of age the incidence rapidly reached its standard level, *e.g.*, of those between one to twelve months 94 per cent. were infested.

In some of our cases the aneurysms had already been opened by students in the dissection classes and so the figures previously given are, if erroneous, an under-estimate since some of the larvae in such cases had either been removed or cut during dissection. The figures which are most likely to be below the actual number are those for larvae recovered from the anterior mesenteric artery because, as a result of examination of the viscera by students, this aneurysm was usually received in two parts, *i.e.*, the intestinal root and the aortic root.

In most cases our figures are much higher than those recorded by Foster and Clark (1937), who found an average of 5 to 10 larvae, rarely over 30, and in a few cases only, 50 or more larvae in the lesions. In the aneurysms examined by us 10 to 218 larvae were found. In those cases in which more than 50 were recovered they were so impacted in the thrombus material that, although there was no complete obstruction to the flow of blood, there would have been almost inevitably some degree of hindrance as a result of any increase in the rate of flow, *e.g.*, after exertion. It is difficult to correlate the number of larvae recovered with the size of the aneurysm since the latter was not measured in every case; however, it is significant that in the largest aneurysm of the anterior mesenteric artery (4·5 × 2·5 inches), encountered in No. 7, the greatest number of larvae (218) was found.

Aetiology of Verminous Aneurysm

The presence of two female specimens of *Triodontophorus tenuicollis* in No. 9 was striking since the only record we have been able to find of the presence of nematodes other than *S. vulgaris* in the anterior mesenteric artery was a case reported by Pinto and Proenca (1938), who found a male *Trichonema goldi* in the last moult as well as last stage larvae of *S. vulgaris* in the thrombus material of an aneurysm of the anterior mesenteric artery in a horse in Brazil. It is not generally considered that either *Trichonema* or *Triodontophorus* species undergo any extensive migration, and these two cases may well be instances of erratic parasites.

Migration of Strongylus vulgaris.—There is still some divergence of opinion concerning the route taken by *S. vulgaris* during its larval migration. For some time there have been two lines of thought, namely, that *S. vulgaris* in their normal course of development cause the formation of an aneurysm of the anterior mesenteric artery and that, after escaping from the thrombus, they later travel back to the intestine *via* the blood and migrate through the wall. The other view, held by Olt (1932), is that the development of an aneurysm is caused by erratic larvae. According to Olt's view, the larvae normally migrate *via* the blood through the liver, heart and lungs, whence they escape from the smaller capillaries into the lung alveoli and so reach the throat and are swallowed; other larvae, having traversed the intestinal wall, wander up between the folds of the mesentery until they reach the root of the anterior mesenteric artery and portal vein. Some penetrate the latter and then follow the route *via* the liver, heart and lungs, whilst other erratic larvae penetrate the root of the anterior mesenteric artery, and moult in the tunica intima or thrombus, which is formed during the larval penetration. Thus, they are held up and cannot be dispersed in the blood stream. An aneurysm then arises as a result of injury to the elastic tissue of the artery.

Wetzel and Enigk (1938) maintained that *Strongylus* larvae do not migrate to the liver, heart and lungs *via* the blood stream, since equines which had been fed with *Strongylus* larvae showed no evidence of migration along the oesophagus or trachea up to 98 days after infection.

With these conflicting views in mind, it is interesting to consider the bearing our findings may have on this migration problem. The picture is complicated by the presence of both *S. vulgaris* and *S. edentatus* in Nos. 7, 8, 9 and 10, because any lesions of the mesentery may be attributed to the migration of either larvae. Thus, the presence of haemorrhages and inflammatory changes in the mesentery may have been due to *S. vulgaris* larvae migrating towards the large abdominal blood vessels or to *S. edentatus* larvae returning from the subperitoneal connective tissue to the intestine *via* the mesentery.

In Nos. 9 and 10 small pin-point haemorrhages could be traced along the course of the mesenteric vessels to the point at which they joined the large mesenteric root.

The small nodules which were found in Nos. 7 and 9 and contained larval *S. vulgaris*, may have been caused by erratic forms, but their presence may also be additional proof of the possibility of a larval migration *via* the mesentery. No *S. edentatus* were ever found in the mesentery.

The small "plaques" on the free border of the small intestine may have been caused by the penetration of *S. edentatus* larvae during their migration from the intestine to their developmental site under the parietal peritoneum. This is only hypothetical evidence since parasites were never found in them.

Finally, the presence of nodules and haemorrhages between the peritoneal layers from the intestine to the root of the mesentery is evidence of some larval

migration along this route. It seems unlikely, however, that development of the larvae in an aneurysm is the normal course, in view of the extent of the lesions of the anterior mesenteric artery and other vessels in such young animals. Since the larvae were so deeply embedded in the thrombus material and arterial wall, and many were almost the size of adult worms, it would seem to be impossible for them to leave the aneurysm and migrate back to the intestine. Actually, in many cases the larvae were so firmly fixed that they could not be removed undamaged. Thus, it seems more likely that these larvae, as well as those found in haemorrhages from the kidneys, are erratic parasites. It is unwise to draw any conclusions concerning the normal route of migration from the material examined in these few cases. Many more observations on living subjects would be necessary to establish the exact pathway along which *S. vulgaris* travel during their development. The normal route taken by migrating larvae of *S. edentatus* is well established and in these few cases there is ample evidence of the migration from the intestine across the peritoneal cavity, and of their encystment and subsequent development under the peritoneum lining the abdominal wall. We have not been able to observe their further development, but they are said to migrate to the root of the mesentery, and pass along between the layers and finally bore through to the intestine again.

Conclusions and Summary

We realise that this is essentially a case record, not even of a complete nature, and from the limited evidence produced not many conclusions can be drawn. We also realise that quite a deal of the material has been recorded before. However, we do feel that some points have been raised worthy of discussion and that the subject has been approached in somewhat different manner from the usual. The parasitological findings have been summarised together with suggestions as regards the pathway of the parasite which these cases have been able to demonstrate. We are of the opinion that, although a parasitic invasion, including the presence of an aneurysm around the root of the anterior mesenteric artery, does not necessarily constitute a clinical picture, an extension of this invasion by means of either the arterial, peritoneal, alimentary or muscular fields will cause marked clinical symptoms. It is difficult to diagnose the onset of clinical manifestations, but it is obvious from the age of these ponies that it can be rapid.

We would suggest that all cases of weakness or "bad doers," if not attributable to other causes, be examined for the possibility of parasitism, and that the examination include a faecal egg count, an extensive rectal and, if necessary, a blood film examination. Where an animal was found to be heavily parasitised, as the result of such examinations, treatment could then be speedily adopted, and the insidious growth of the parasites could be arrested.

Acknowledgments

Our thanks are due to all students of the Royal Veterinary College who have co-operated in searching for specimens and noting tissue changes, to Messrs. I. Fincham, E. F. Lewis, P. R. Blair-Fish and J. Hancock for the preparation of the photographs, and to Mr. H. Pool for the assembly of the specimens.

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(*To be continued with report of discussion.*)

BOVINE TUBERCULOSIS IN IRELAND

The Lancet, in a recent issue, stated: "No information has ever been available as to the extent of bovine tuberculosis among animals in Ireland, and until the recent study made by Dr. Cecil Mushatt there had been no attempt to discover the extent of human infection by the bovine type of tubercle bacillus. Dr. Mushatt, working with the aid of a grant from the Irish Medical Research Council, has now investigated this subject, and has summarised his findings in the October issue of the *Irish Journal of Medical Science* (p. 683). His conclusions have an important bearing on problems of public health as they affect Ireland. Material from the cervical glands, the bones and joints, and the meninges was studied in 50 children under 15 years of age. The series is admittedly small, but the sample appears to be as representative as possible, for while 27 of the cases were from Dublin city and county the remainder were from 12 other counties, including areas in each of the four provinces. In the cervical-gland cases 10 out of 14 yielded the bovine type, in the bone and joint cases 4 out of 22, and in the meningeal cases 3 out of 12; in 2 cases of primary abdominal tuberculosis the human type was found. Dr. Mushatt concludes that while human tuberculosis of bovine origin is only a relatively small part of the whole problem of tuberculosis in Ireland, nevertheless that form of tuberculosis causes a vast amount of suffering and ill-health. The value of Dr. Mushatt's paper is increased by his discussion of methods of prevention, and his criticism of Irish legislation in so far as it concerns the control of the milk supply."

THE VETERINARY RECORD

May 17th, 1941.

MAKE FRUITFUL THE LIVESTOCK

A CORRESPONDENT in our issue of April 26th has very pertinently drawn the attention of the profession to the basic fact that if the profession is to make that contribution to the improvement in the health of the livestock of the country that is envisaged in the Report of the Survey Committee, it is essential that our young men about to leave college should have received a training which adequately fits them for this further extension of their legitimate work.

Both active research and an enthusiastic field practice are vital to the development of a progressive scientific profession and each of these, to be effective, depends upon a sound system of education.

As a temporary measure, shortcomings in professional knowledge and skill may be met by such private tuition as that being arranged with the assistance of the National Veterinary Medical Association on useful techniques for dealing with such diseases as bovine sterility and mastitis. But these steps can in no way supplement the need for a much more comprehensive training at the student stage. As pointed out by our correspondent, the curriculum for the Membership Diploma of the Royal College of Veterinary Surgeons could usefully be re-modelled, giving increased attention to preventive medicine and animal husbandry and modifying the emphasis now laid upon veterinary anatomy.

Although human memory is short, our readers will recollect that the Loveday Committee in its Report forcefully indicated that considerable re-casting of the veterinary curriculum, with a re-orientation of outlook, was necessary if the veterinary surgeon was to assume his rightful place as the " Physician of the farm and a guarantor of the nation's food supply."

The Survey Committee has done well in indicating how to improve the productivity of our livestock under war conditions, but if we are to make fruitful our livestock so that agriculture may continue to prosper in the post-war period, the profession must see to it that its knowledge and practice are well grounded and adequate both for the maintenance in health of the livestock of the country and the control of animal diseases.

Despite the fact that the Council of the R.C.V.S. did not feel itself able to accept immediately the recommendations of the Report on Veterinary Education, it devoted considerable time to their serious consideration. At the outbreak of war, however, it decided that further consideration would be inopportune. Whilst agreeing with this view at the time, this journal now feels that, particularly when it is remembered that any change in the curriculum must take at least five years to produce results, it is highly desirable that the governing body of our profession should again turn its attention to the consideration of the above Report. We were therefore gratified to note from the published minutes of the last meeting of Council, R.C.V.S., that a motion has been tabled giving notice to rescind the previous decision of the Council to do nothing in this matter during the war.

ABSTRACTS

[SPECIES VARIATION IN THE INSULIN CONTENT OF PANCREAS. Marks, H. P., and Young, F. G. (1940.) *Nature, Lond.* **146**. 31-32. (6 refs.).]

The administration of diabetogenic pituitary extract to a dog causes a diminution in the insulin content of the pancreas, whereas the reverse effect occurs when a rat is similarly treated. In following up these observations by the administration of pituitary extracts to further species, the authors observed substantial differences in the normal insulin content of the various pancreases. These are best represented in the following table, which is modified from the original :

Species	Insulin Content of Pancreas: Units per Gramme Pancreas	Units per Gramme Bodyweight
Chimpanzee	11·2	1·01
Dog	3·3	0·76
Cat	2·2	0·47
Rabbit	9·5	1·42
Guinea-pig	0·08	0·028
Rat	1·3	0·62
Mouse	1·7	1·87

The very low values obtained for the guinea-pig were surprising, in view of the fact that well-developed β-cells are found in the pancreatic islets of this species. A partial explanation was suggested by the results of dissolving a known quantity of insulin in an extract of guinea-pig pancreas and injecting it into mice : the activity was found to be only 50 per cent. of the theoretical. No such reduction in activity was found to have occurred when mice were injected with insulin on one side and with extract of guinea-pig pancreas on the other. It is not considered, however, that the substances present in guinea-pig pancreas which must interfere with the absorption of insulin from subcutaneous tissues are sufficient to account for the remarkably low results obtained in the assays.

A. N. W.

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[THE EXAMINATION OF THE FUNDUS OF THE HORSE'S EYE, AND NOTES ON ITS PATHOLOGY. Short, G. V. (1940.) *J. R.A.V.C.* **11**. 2. 33-39 and **11**. 3. 90-92. (4 figs.).]

For the examination of the fundus of the horse's eye the author advocates the dilatation of the pupil by atropine, followed by the use of the ophthalmoscope. An even source of illumination is provided by covering the door of a loose-box by a sheet. Some restraint is necessary for restive horses, but most animals rapidly accustom themselves to the procedure.

The normal disc is pale salmon-pink in colour with a ring of uniformly lighter tint around its edges. Surrounding the disc is the densely pigmented area

of the choroid. This ends abruptly in a line parallel to the long axis of the disc and is succeeded by the characteristic blue-green fluorescence of the tapetum. Branches of the central artery of the retina cross the edge of the disc and disappear in the pigmented zone.

A number of pathological abnormalities of the fundus are described.

Choroiditis apigmentosa appears as one or more yellowish or white unpigmented areas in the pigmented zone. Since direct illumination fails to show up these patches, a lateral ray of light is necessary for their detection. Cases usually commence with ophthalmia. The affected eye is tightly shut. The ophthalmia subsides in about one week, and the sight is unimpaired.

Pigmented atrophy of the retina is difficult of diagnosis. The only early sign is a sluggish or partial pupillary reflex. Examination of the fundus shows abnormal concentration of pigment into a curved band at the nasal side of the disc which gradually becomes pale buff in colour. The arterial branches disappear and the sight is progressively impaired. The condition is usually unilateral.

Rupture of the choroid is frequently the result of contusion of the eyeball. In early cases a distinct red reflex is seen over the seat of the injury. This is rapidly absorbed. The rupture then appears as one or more curved white streaks towards the temporal side of the disc. The tapetum is ruptured with the choroid. No impairment of vision appears to occur.

Separation of the choroid is most commonly seen as a sequel to luxation of the lens or to an absorbed cataract. The fundus appears diminished in size and slightly fogged. The detached portion of the choroid is markedly out of focus and difficult to detect. Reattachment may occur later. Two cases of this condition are described.

D. D. O.

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[AMPUTATION OF THE TEAT IN CATTLE. Elam, C. W. (1940.) *Vet. J.* **96**. 454.]

The author describes a comparatively simple technique. He advocates the use of an ethyl-chloride spray in preference to hypodermic local anaesthesia. A 1-in. wide sterile tape encircles the teat well above the site to control haemorrhage. The teat end is rapidly severed with a sterile safety blade. The ligature is loosened to allow the flow of pus from the affected quarter. The ligature is then tightened and allowed to remain five to six hours. After-treatment comprises bi-daily irrigation of the quarter.

G. V. L.

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[PRELIMINARY OBSERVATIONS ON THE DURATION OF IMMUNITY IN CATTLE VACCINATED IN CALFHOOD WITH STRAIN 19 OF *BRUCELLA ABORTUS*. Delez, A. L. (1940.) **97**. 581.]

Thirteen calves, all of which eventually completed two pregnancies, were used in the experiment. When between four and six months of age nine of the calves were vaccinated with living attenuated *Br. abortus* (Strain 19), while the remainder acted as controls. At the completion of the first pregnancy each animal carried a calf to full time, but two calves from the controls were born dead. During the fifth and sixth months of the second pregnancy each animal received approximately 240 million recently isolated *Br. abortus* on the conjunctiva. Six of the principals gave birth at full term to living calves, while the remainder, in all of which *Br. abortus* was demonstrated, gave birth to living calves during the eighth and ninth months of gestation. Of the controls, one aborted during the seventh month, one gave birth to a living calf during the eighth month, and two produced dead calves.

A. W. T.

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[TOXIC MANIFESTATIONS AFTER ORAL ADMINISTRATION OF SODIUM SULPHAPYRIDINE. Molitor, H., and Robinson, H. (1939.) *Proc. Soc. Exp. Med. Biol.* **41**. 409-410. (5 refs.).]

The toxic effects of sodium sulphapyridine were tested by the administration *per os* of a 10 per cent. aqueous solution of the drug to 160 mice, 150 rats, 24 rabbits and 21 monkeys. Single doses of 3 and 4·5 g. per kg. produced slight gastritis in mice, rats and rabbits, and frequent urolithiasis in rats and rabbits. Symptoms became more severe on repeated administration. In 8 out of 10 monkeys tested 0·5 g. per kilo produced gastritis and marked urolithiasis; 0·25 g. per kg. caused urolithiasis in 3 of 5 animals; and 0·1 g. per kg. had no toxic effects. Doses of 2 to 3 g. per kg. in rats caused general debility and loss of weight, and on repeated dosage, haematuria, renal calculi and severe hydronephrosis. Urolithiasis occurred in 13 of 14 rats dosed daily for 10 days. The changes in the urinary tract in rats, rabbits and monkeys varied from mild dilatation of the ureters with little or no change in the kidney to enormous dilatation of the ureters with partial disappearance of the kidneys. No evidence of urolith formation was found in mice. These observations are of great therapeutic significance.

D. D. O.

PASTEURISATION AND THE PHOSPHATASE TEST

"Though not officially recognised, the phosphatase test is playing an increasingly important part in the control of pasteurisation. By its means it is possible to detect a lowering of 1·5° F. in the temperature or of ten minutes in the time at which the milk is held during processing, as well as the admixture of as little as 0·2 per cent. of raw milk with the pasteurised product. Very great care has to be exercised in its performance, and apart from imperfect standardisation or contamination of the reagents employed, the exposure of the test substances to sunlight, the presence of tobacco smoke in the laboratory, or even the use of carbolic soap for washing the hands may affect the result. The value of the test in the routine control of milk supplies is aptly illustrated by a recent pamphlet written by Mr. Ben Davies, Director of Laboratories, United Dairies, Ltd. During the two years March, 1938, to April, 1940, of 1,544 consecutive samples of United Dairies milk taken by sanitary inspectors—samples representative of 1,000 million bottles of milk—all but 32 passed the test satisfactorily. Reasons are given for believing that the failures were due mainly or entirely to improper sampling of the milk, particularly the use of a jug that had previously contained raw milk. Examinations by health authorities in different parts of the country have now shown the freedom from tubercle bacilli of milk pasteurised by the large dairy companies. The present results with the phosphatase test add confirmation to these findings."—*British Medical Journal.*

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It was reported to a meeting of Holland (Lincs) Agricultural Committee that the serious swine fever position existing during the past two years had now improved, only one of 13 cases reported in the past quarter being confirmed.

IN PARLIAMENT

The following are among the questions and answers recently recorded in the House of Commons:—

Civil Defence: Compensation for War-service Injuries (N.A.R.P.A.C. Personnel)

Captain Plugge asked the Minister of Pensions whether veterinary surgeons, animal service helpers, and animal stewards, who have enrolled with the National Air-raid Precautions Animals Committee are covered for the purposes of civil defence service injuries in the performance of their important duties concerning casualties due to enemy action among the animal population of the country.

Sir W. Womersley: The Schedule of Civil Defence Organisations attached to the Personal Injuries (Civilians) Scheme includes "any organisation established and maintained by the National Air-raid Precautions Animals Committee for the purpose of protecting the public from animals which become panic-stricken or contaminated with gas as a result of enemy action."

Members of such an organisation are therefore eligible for compensation as civil defence volunteers in respect of war service injuries.

At a later date Mr. Price asked the Minister of Pensions whether he can state more precisely the circumstances in which compensation can be granted to persons suffering injuries from enemy action whilst participating in air-raid precautions work in connection with livestock; and whether veterinary surgeons, animal students or other persons proceeding to farms to deal with injured livestock are covered in this connection?

Sir W. Womersley: Compensation may be awarded at one or other of the rates laid down in the Personal Injuries (Civilians) Scheme to all persons who suffer war injuries. The types of persons mentioned in the Question are in this respect no different from similar members of the civilian population.

Civil Defence: Anti-gas Precautions

Mr. Price asked the Home Secretary whether, in view of the possibility of gases being used in the near future during the course of enemy action in this country, he has ensured that the personnel of the air-raid precautions for animals service are adequately supplied with the necessary equipment for dealing with gas-contaminated animals both in towns and in the country?

Mr. Mabane: I have no reason to believe that the National A.R.P. Animals Committee is not provided with equipment for the purpose indicated by my hon. Friend, but if he has any particular deficiencies in mind I shall be glad to investigate them if he will let me have details.

. . . . . .

Dairy Herds (Reduction)

Colonel Carver asked the Minister of Agriculture what percentage reduction after midsummer is contemplated in dairy herds?

Mr. Hudson: The percentage reduction contemplated in dairy herds will vary according to the character of the herd. In some cases no reduction will be needed, but where cows are kept intensively mainly on purchased feeding-stuffs or the herd includes a number of animals of an inferior type or suffering from disease, with low milk yields, a certain reduction in numbers might be desirable.

Mr. Sloan asked the Secretary of State for Scotland whether, with a view to any reduction likely to take place in the number of cows in dairy herds, he will say what quantity of feeding-stuffs may be expected by dairy farmers next winter?

Mr. Johnston: No precise undertaking can be given in existing circumstances, but the Government's policy is and will be directed to the maintenance of an adequate milk supply and dairy herds will continue to receive a preference in regard to such imported feeding-stuffs as become available. Farmers, however, have been repeatedly warned that they should endeavour to make themselves independent of purchased supplies in their own interest.

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Medicine Stamp Duties

Captain Plugge asked the Minister of Health when he proposes to introduce the promised legislation in connection with the annulment of the medicine stamp duties?

Mr. E. Brown: This legislation will be introduced as soon as practicable, but I am not yet in a position to make any statement as to the precise date of introduction.

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Poultry (Ration)

Captain Cunningham-Reid asked the Minister of Agriculture whether he will increase the ration of corn for poultry?

The Parliamentary Secretary to the Ministry of Agriculture (Mr. T. Williams): Rations for poultry are governed by the quantity of feeding-stuffs available and could only be increased by reducing the quantities available for other classes of livestock or for direct human consumption. My right hon. Friend regrets that it is not possible to increase them.

Captain Cunningham-Reid: Why is it so important that a racehorse gets a ration of 15 lb. of corn per day, and so unimportant that thousands of poor people are having to kill off their poultry because they cannot get sufficient food for laying purposes?

Mr. Williams: I think the hon. and gallant Gentleman must be under a delusion. Instead of killing off their poultry, small poultry keepers have been increasing enormously.

. . . . . .

Condemned Meat, Salisbury

Sir L. Lyle asked the Parliamentary Secretary to the Ministry of Food whether his attention has been called to the report of the food officer for the Rural Council of Salisbury, Wiltshire, that in four weeks over 11,000 lb. of beef, 5,000 lb. of pork, 827 lb. of mutton and a quantity of veal had had to be condemned, and whether he can make any statement both on the causes of such waste and the steps taken to prevent its recurrence?

Major Lloyd George: My attention has been called to the report referred to which dealt with a period in November-December, 1940, and I have had it investigated. About 90 per cent. of the meat in question was condemned for disease. The amount of condemnation for this reason at Salisbury slaughterhouse, I am informed, is proportionally the same as before the war. The balance was due primarily to heavy and abnormal slaughtering resulting from outbreaks of foot-and-mouth disease in the Salisbury area. As a result transport facilities during the period were necessarily of an improvised type and in addition some of the meat was not packed as carefully as it would have been under normal conditions. I can assure my hon. Friend that every effort is being made by my Department to prevent the loss of meat fit for human consumption.

NOTES AND NEWS

The Editor will be glad to receive items of professional interest for inclusion in these columns.

Diary of Events

May 23rd.—Meeting of the Yorkshire Division, N.V.M.A., at Leeds, 3 p.m.
June 9th.—D.V.S.M. Examination at Glasgow Veterinary College.
June 19th.—R.C.V.S. Annual General Meeting, Royal Station Hotel, York.
June 20th.—R.C.V.S. Committee and Council Meetings, Royal Station Hotel, York.
June 26th.—R.C.V.S. Written Examination begins.
June 30th.—R.C.V.S. Oral and Practical Examination begins.

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The attention of members, N.V.M.A., is drawn to the fact that in the supplement to this week's issue there is published an important *errata* notice relating to the contents of last week's supplement.

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An Insurance Reminder

In view of the receipt of several communications from members of the Association on the subject of insurance, the N.V.M.A. wishes to call attention to the following facts.

National Health Insurance.—If the rate of remuneration of a veterinary assistant does not exceed £250 per annum, he is compulsorily insurable under the National Health Insurance Acts.

Unemployment Insurance.—In the case of unemployment insurance, a member of the veterinary profession is insurable if he is in receipt of a salary of less than £420 per annum.

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Scheme for the Control of Diseases of Farm Livestock

Another meeting was held at the headquarters of the National Farmers' Union, on Tuesday, May 13th, between representatives of the Union and of the National Veterinary Medical Association. Mr. Nathan and Mr. Cabot represented the Animal Health Division of the Ministry of Agriculture and Fisheries.

A further discussion took place upon the scheme put forward by the National Veterinary Medical Association for the control of certain diseases of dairy stock, and considerable progress was made towards agreement. The representatives of the National Farmers' Union showed great interest in the scheme and a keen desire to overcome all obstacles.

It was decided to hold a further meeting on Tuesday, May 27th.

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Application of Results of Agricultural Research

Minister's Announcement of a New Body

In the course of his contribution to the recent debate on food production, with the House of Commons in committee on Supply, the Minister of Agriculture, Mr. R. S. Hudson, referred to the shortage of technical officers from which the industry was now suffering, and said that that brought him to the question of agricultural research, which he regarded as of very great importance.

The Minister continued: "The Select Committee described the present state of affairs. I had already reached the conclusion from my own investigations that the position was not satisfactory. Certainly the results of British research, which are not inconsiderable in themselves, have only too often in the past been made much more use of by foreigners than by British farmers. I represented the matter to the Lord President of the Council, within whose purview agricultural research falls. A committee was sitting under the chairmanship of the Chancellor of the Duchy of Lancaster, concerned with the extent to which the Government are making use of scientific research, and they considered this question. The Lord President of the Council has asked me to state the action which it is now proposed to take to remedy the existing state of affairs. The Agricultural Research Council will be granted an increased sum for use at its completely unfettered discretion in promoting basic or fundamental research. It is hoped by this means that it will be possible to use, to the advantage of agricultural research, the very best brains in the scientific world. As I said, the Council's control over the use of this sum of money will be completely unfettered. At the same time it will continue, as in the past, to exercise general scientific supervision over the research being carried on at the various institutes. This will be done, as heretofore, in consultation with the Secretary of State for Scotland and myself.

"At the same time we are impressed with the need of taking more active steps to see that the results of research are made known to the ordinary farmer and given greater opportunities of establishing themselves in everyday practice. To this end I propose to appoint a body for England and North Wales which will be responsible to me directly and which I hope will command as much respect in the agricultural world as the Agricultural Research Council does in the scientific world. The functions of this new body will be twofold. On the one hand, it will be concerned to devise methods for seeing that all promising results of research are applied as rapidly as possible to the problems of agriculture and are incorporated in the practice of the everyday farmer. On the other hand, it will keep me informed—so that I can advise the Agricultural Research Council—on any problems of agricultural practice which it considers should be the subject of scientific investigation. The name of the new body has not been decided, nor have its members been appointed. A further announcement will be made on this in due course. As Scottish problems do in many respects differ considerably from those of England and Wales, my right hon. Friend, the Secretary of State for Scotland, will appoint a similar body for Scotland. I should add that it is hoped that members of the Agricultural Research Council will be appointed both to the English and to the Scottish bodies so as to preserve as close a liaison as possible."

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PERSONAL

Birth.—Anderson.—On May 3rd, 1941, to Joan, wife of L. Guy Anderson, B.V.Sc., M.R.C.V.S., Aylesbury, a son.

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"A USEFUL BASIS FOR CULLING STOCK"

The agricultural Press continues editorially to "feature" the recommendations for the control of certain of the diseases of livestock made in the Report of the Association's Survey Committee, and, as the following excerpt from *The Farmers' Weekly* of May 9th reveals, awaits with interest the result of the conversations now taking place with other bodies concerned, on the proposals embodied in the associated scheme.

Referring first to the "panel insurance" scheme for livestock, the Editor comments that this "seems still to be on paper," and proceeds: "Of course, there is no lack of drive on the part of the men who devised that scheme, but anything of the sort has to go through all kinds of official and unofficial channels, 'avenues' and so forth, all of which hold things up. Rumour has it that there has been a lot of discussion about it in recent weeks by authorities and interested parties. I hope those discussions will be fruitful and certainly the position is hopeful. Actually, the scheme was first described in

The Farmers' Weekly, and that as far back as last November.

"What does occur to me, however, is that, had that scheme been in full operation, it would have proved a very useful basis on which we could have culled our stock. Reduction on a health basis might have obviated so heavy a cut in numbers, and, better still, the reduction could have been turned into lasting benefit for the industry. Is it too late?"

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LEGAL NOTES

Unlawful Use of Title.—The Welsh Gazette reports that, at Tregaron sessions, George Davies, Tynant, Llwynpiod, was charged with unlawfully using the title of veterinary surgeon. Defendant pleaded "Not guilty."

Mr. T. Eyton Morgan, prosecuting for the Royal College of Veterinary Surgeons, said it might seem strange that so few prosecutions were taken. One knew that there was a good deal of surgery in the veterinary line carried on, but it was very rarely that the actual words "veterinary surgeon" were used. It was emphasised that the defendant was not being prosecuted for giving attention to animals, but for using the title and describing himself as a veterinary surgeon. On November 20th, 1940, defendant applied to the Petroleum Office, Cardiff, for a supplementary petrol allowance, and described himself on the application form as a veterinary surgeon. Defendant might state that the form was filled in for him by Mrs. Morgan, The Garage, Tregaron, but that form could only have been filled in on information supplied by the defendant, and it bore his signature.

Evidence was given by Hugh Bryce-Smith, of Cardiff, assistant divisional petroleum officer, with liaison duties, who said defendant's name was not on the register of the Royal College of Veterinary Surgeons.

Defendant said he went to Tregaron garage on November 20th, 1940, on behalf of his father, who was "out of petrol." They only had six gallons a month, and his father had to go about the country attending animals. Mrs. Morgan advised him to apply for more petrol, and undertook to fill in the form. He signed the form without reading it, and what he had done was done in ignorance.

Mr. F. H. Jessop (Messrs. Smith, Davies and Jessop, Aberystwyth) prosecuted on behalf of the Board of Trade against the same defendant for having made a false statement contrary to Defence Regulation No. 55.

Mr. Jessop referred to the rationing of motor fuel controlled by the regulations, and said if a person was described as a veterinary surgeon he was entitled to an extra supply. Defendant, who was interviewed by Sergt. Jones, said Mrs. Morgan, Central Garage, filled the form, and she was probably under the impression that the petrol was required for his father, who was a veterinary surgeon, and it was the result of a misunderstanding between him and Mrs. Morgan. If his statement had been believed, he would have received petrol to which he was not entitled. "This sort of thing would strike at the root of petrol rationing," said Mr. Jessop, "and would reduce the system to a farce."

Hugh Bryce-Smith and P.S. Jones, Tregaron, gave evidence.

Defendant, who said he was sorry this had happened and that it had been done without thinking, was fined £1 and costs on each charge, the Chairman stating that defendant was being dealt with leniently as costs were heavy.

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ROYAL ARMY VETERINARY CORPS

Our readers will join with us in congratulating Captain John Clabby, R.A.V.C., on the award of the M.B.E. for his services in the Middle East.

Major C. M. Stewart has been promoted to the rank of Lieutenant-Colonel, and the following officers have been granted the rank of Acting Lieutenant-Colonel: Majors J. J. Clune, R. H. Knowles, J. J. Plunkett and A. A. Pryer.

WEEKLY WISDOM

The windows of my study look on the tranquil court of an ancient college, where the sundial marks the silent passage of the hours. . . . Here, if anywhere, remote from the tumult and battle of the world with its pomps and vanities and ambitions, the student may hope to hear the still voice of truth, to penetrate through the little transitory questions of the hour to the realities which abide . . . while the generations come and go.—Sir James Frazer, O.M., author of "The Golden Bough," decd. May 7th, 1941.

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Wet brewers' and distillers' grains have been derationed by the Ministry of Food for the summer months. This has been done to enable farmers to pit or clamp the grains for next winter's use. They can also be used for summer feeding to dairy herds. It is intended, the Ministry add, that wet grains will be rationed once again in the autumn.

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Burroughs Wellcome & Co.—Change of Address.—Burroughs Wellcome & Co. announce that all communications should now be sent to their temporary offices at: 183, Euston Road, N.W.1. Telephone: EUSton 4477. It is requested that customers should repeat all orders sent to the company during the week ending May 10th for which they have not yet received goods.

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Dr. A. Leslie Sheather, Wroxton, Chorleywood, Herts, writes: "A few months ago you kindly inserted a note asking members to return to me any blood sample tubes that they might have lying idle. Unfortunately, I did not receive a single tube back in response to that request. As the position with regard to tubes has become even more acute than it was then, may I ask members to search their shelves and cupboards for idle tubes and to return them to me as soon as they possibly can."

CORRESPONDENCE

Letters to the Editor should reach the Office not later than by the first post on Tuesday morning for insertion in following Saturday's issue.

The views expressed in letters addressed to the Editor represent the personal view of the writer only and must not be taken as expressing the opinion or having received the approval of the N.V.M.A.

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THE CONTROL OF DISEASES OF LIVESTOCK

To the Editor of the Veterinary Record

Sir,—I am rather wondering whether the advice given by the Survey Committee of the N.V.M.A. in regard to the treatment of mastitis is sound.

Their recommended treatment for mastitis in the Supplement to *The Veterinary Record* which has just reached me is:—

"1. Due to *Str. agalactiae.*

(*a*) Sulphanilamide Therapy."

Messrs. May & Baker in their latest brochure on the sulphanilamides say:—

"In *chronic* contagious mastitis caused by *Streptococcus agalactiae,* however, results have been *less* favourable. The administration of *large* doses of sulphanilamide to cows *over fairly long periods* results in definite clinical improvement and *may* cure 50 per cent. of cases, but in others there is only a *transitory decrease* in the number *streptococci* and *leucocytes* in the milk, and *relapse frequently follows stopping of the treatment.* Success is more likely to be obtained in recent infections than in those of long standing."

Messrs May & Baker are to be commended for this candid exposition.

Yours faithfully,

J. W. Hall Masheter.

Ruddle House,
Newnham-on-Severn,
Gloucestershire.
May 9th, 1941.

THIS FIRING QUESTION

To the Editor of the Veterinary Record

Sir,—In an epoch long ago divested of the last remnant of commonsense, surely we, as a profession, need not attempt to add to the present wave of insanity by suggesting that an analogy might be drawn between the tensile capabilities of living tissue and the non-tensile ones of a metal, to arrive at a logical conclusion on the above. A metal can be tested in its permanent state at any time, and if up to standard made into a product. Living tissue can only be tested when it is living.

Clinical experience over many years clearly shows that when—as in every line of treatment—properly applied firing gives the best results, and that its justification does not require histological proof—*presumably after death*, of tendons—a comparison of their reaction to undue strain with that of a metal which, being eternally dead, rarely varies.

In answering the question, "to fire or not to fire?" one is surely, in the first place, guided by two very simple factors: the first, the nature, duration, and extent of the ailment; and the second, the class and the age of the horse, and the nature of the work which it has to do when sound.

That firing was carried out indiscriminately in the past few will deny, but in this failing our ancestors were no exception. We, their descendants, are just as bad, and are apt to go the "whole hog" with a line of treatment, and in the end, kill it, by our over-zeal.

Once upon a time, no matter what the ailment, man and beast were bled. Nowadays this is never carried out, although it is highly probable that not a few cases of obstinate lymphangitis in the horse would benefit by the withdrawal of a good amount of blood: and the acute cases of congestion following great exertion.

Most of us, of my age, entered the profession at the time when the birth of autogenous vaccines had just occurred, and have well-nigh witnessed their complete extinction through their indiscriminate application: and it is probable that, allowing for the "blitz" and the natural sequence of events, not a few may live to see the same thing happen with the sulphonamide preparations.

Yours faithfully,

J. F. D. Tutt.

"Rothiemurchus,"
St. Cross,
Winchester.

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INTERESTING OBSERVATIONS

To the Editor of the Veterinary Record

Sir,—In *The North American Veterinarian* for March, 1941, among the interesting items recorded are two which may be specially useful to practitioners.

(1) "*Milkers' Nodules.*"—At page 137 there is a short article on this subject from a paper read by Dr. F. T. Becker at the 1940 meeting of the American Medical Association. After saying that he finds no description of milkers' nodules in American literature, Becker observes that he encountered four cases of the disease during the summer of 1939. At the onset an erythematous papule develops which slowly increases in size, becoming a firm, elastic, bluish red nodule from 1 to 2 c.m. in diameter. The nodule causes only slight pain and mild itching. Becker goes on to state that all cases of milkers' nodules have occurred in people employed as milkers of cows on whose udders crusted or ulcerated lesions existed and that all cases have developed late in the summer. Most investigators consider that a virus is the cause of the condition. Becker characterises the disease as "an infection of human beings acquired by milking diseased cows."

(2) *Milk fistula of the cow's teat* (by L. A. Taschhausser, D.V.M.).—The cow is operated on when dry. To close the fistula take a couple of toothpicks and wrap the small end of each one with just a few strands of long fibre cotton. This is dipped into butter of antimony and the surplus wiped off on the mouth of the bottle. The area of the teat around the fistula is now anointed with some kind of bland ointment or vaseline. Then, one at a time, the toothpicks are passed into the opening or fistula and rotated. All is completed in less than one minute.

Yours faithfully,

G. Mayall, M.R.C.V.S.

Bolton.

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FOETAL ABNORMALITIES

To the Editor of the Veterinary Record

I have read with interest the letters on this subject, more particularly as it has been my misfortune to encounter four cases of the "everted calf" (schistosomus reflexus) in as many years.

If my memory serves me right, all four cases were in heifers: two Guernseys, one Ayrshire and one polled crossbred.

In all cases I found the viscera presented and limbs and spinal column an anchylosed mass. I succeeded in delivering one foetus but during delivery the sharp edge of the everted ribs badly lacerated the roof of the uterus and the heifer died of peritonitis about a week later.

My experience of these cases and Mr. Smythe's lucid account of his Caesarian section have determined me to perform this operation on the next one I meet. The operation if successful would seem to cause less discomfort than a difficult delivery through the normal channel and if unsuccessful would have much the same result as unsuccessful delivery by any other means.

Fleming (*Veterinary Obstetrics*) gives the following explanation of this type of monster. "The embryo is at first a small thickened area on the surface of the ovum. The edges of this area curve in to join and close the body cavity. Failure to do this causes the exposure of the contained organs." No reason for the failure is advanced.

Yours faithfully,

N. Robert Turnbull.

22, Worting Road,
Basingstoke.

May 9th, 1941.

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To the Editor of the Veterinary Record

Sir,—The case recorded by Mr. Smythe, of Camborne, and Mr. James Robertson's letter, in the issues of the *Record* of April 26th and May 3rd respectively, prompt me to add my experience of this particular type of foetal rarity. I have had three such cases in my short experience. Happily for me, in the first case I was out when the message was sent in, and when I arrived at the farm I saw that the cow was quite a large animal, had had quite a few calves in her time, and was in no way distressed. As I prepared to see what was wrong, she presented and calved the foetus without help, which answers Mr. Robertson's description well. The other two cases were not so hard to deal with on account of the experience gained by watching the first and examining it later on. The second case took about two hours' hard work, as it was plainly a case for embryotomy as it was a heifer, and the third foetus came away with a certain amount of traction. Both of these cases—as well, of course, as the first case—made uneventful recoveries.

Yours faithfully,

G. A. Keatinge.

Church Street,
Portadown,
N. Ireland.

May 3rd, 1941.